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EXAMINER	
ROGERS, DAVID A	
ART UNIT	**PAPER NUMBER**
2856	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/022,469	CAREY ET AL.	
	Examiner	Art Unit	
	David A. Rogers	2856	MW

-- The MAILING DATE of this communication appears on th cover sheet with the correspondence address --

Period f r Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 June 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-63* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-63* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 June 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.

4) ☐ Interview Summary (PTO-413) Paper No(s). _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other:

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1, 44, 45, and 53 have been considered but are moot in view of the new ground(s) of rejection.

Drawings

2. The new drawings were received on 10 June 2003. These drawings are acceptable

Claim Objections

3. Claim 1 is objected to because of the following informalities. It is recommended that the claim be rewritten as follows:

> 1. A method for inspecting for small holes in webs comprising the steps of:
>
> moving a web comprising a film through a machine in a direction along a length of the web;
>
> causing a liquid to pass from a first surface of the web through small holes to a second surface of the web by applying a vacuum to the second surface of the web;
>
> inspecting the second surface of the web to detect liquid that has passed from the first surface of the web through the small holes at the inspection surface;
>
> and where at least one of the causing and inspecting steps occurs while the web is moving through the machine.

4. Claim 43 is objected to because of the following informalities. It is recommended that the claim be rewritten as follows in order to accurately distinguish between the surfaces:

> 43. A method for inspecting for small holes in webs comprising the steps of:
>
> moving a long web of laminate through a machine in a direction along a length of the laminate;
>
> applying a vacuum to a first exposed surface of the laminate from a vacuum source that spans the width of the laminate;
>
> supplying liquid to a second exposed surface of the laminate from a source that spans the width of the laminate to form a film of liquid; and

inspecting the second exposed surface of the laminate using a macine vision system to detect liquid that has passed from the first exposed surface of the laminate through small holes to the second exposed surface;

and where the steps of applying, supplying, and inspecting are all performed while the laminate is moving through the machine;

and where the vacuum produces a pressure differential between the first exposed surface and the second exposed surface that is at least as large as a maximum pressure differential between the surfaces that is expected to occur during subsequent processing and use;

and where the first exposed surface and the second exposed surface are disposed on opposite sides of a barrier layer of the laminate.

It is also recommended that the applicant use the terms "first surface" and "second surface" in the claims 54-63 to ensure clarity of the claims.

5. Claims 5, 6, 8, 9, 15, 21 are objected to because of the following informality. Replace --the other surface-- with --the first surface--.

6. Claim 10 is objected to because of the following informality. Replace --the surface-- with --the first surface--.

7. Claims 13, 16 are objected to because of the following informality. Replace --the one surface and the other surface-- with --the first surface and the second surface--.

8. Claim 29 is objected to because of the following informality. Replace --rinsing a surface-- with --rinsing the second surface--.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 1-13, 15-18, 20-24, 26-28, 31-35, 40, 43-45, 49-53, 55-59, 62, and 63 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent 3,811,317 to Leonard *et al.* in view of United States Patent 3,937,064 to Wolf, Jr. *et al.*, United States Patent Application Publication 2002/0019187 to Carroll *et al.*, and United States Patent 5,274,243 to Hochgraf. Leonard *et al.* teaches that it is known to use a liquid and a vacuum to detect pinholes in moving webs. In particular, Leonard *et al.* teaches methods and devices testing membranes for pin hole leaks are provided wherein the membrane (reference item M) is supplied from a storage roll (reference item 11) to pass in unison with a detector or indicator means (reference item D) through a combined detector fluid applicator and draw-off station, where the detector fluid passes through any holes in the membrane and changes the state of or exposes the detector means. The test station employs a compartmented distributor head having a vacuum slit through which the membrane and the detector means travel. The presence of the membrane and detector means in the slit divides the head into a detector fluid supply chamber that is bounded by the membrane and a vacuum chamber that is bounded by the detector means. The testing procedure maintains the pressure differential across the membrane approximately at the value experienced by the membrane in actual service. It would be obvious that the tested pressure would be the maximum pressure as this would ensure that the membrane was properly certified for use in the service environments. A travel speed of about 10 ft/min is employed and the membrane is advanced through the vacuum slit in light wiping contact with fluid distributor element. A membrane testing arrangement is shown in figure 1 wherein the membrane (reference item M) to

be tested is provided in strip form and is supported on a supply roll (reference item 11). A detection means is shown in the form of an indicator medium such as diazo paper (reference item D) for recording or mapping defects in the membrane. The diazo paper is stored on a supply roll (reference item 12) beneath the membrane roll. The membrane and the indicator paper are shown passing in unison along a test path that leads through a chambered test station (reference item 13) where a detector fluid, such as ammonia, is applied directly to the membrane while a vacuum is maintained beneath the indicator paper. The vacuum acts through perforations in the indicator paper provided by the perforator wheel (reference item 12P) to cause the ammonia to be drawn through any pinholes in the membrane for producing indications on the paper at locations corresponding to the locations of such pinholes. As the membrane and paper move in unison, any pinholes in the membrane remain in register with the indications appearing on the paper to allow immediate repair. To facilitate transport of the indicator paper and membrane through the test station, a conveyor including a drive belt (reference item 19) in the form of a continuous loop of woven nylon mesh is mounted on guide rollers (reference items 20 and 21) located fore and aft of the test head (reference item 13). The nylon mesh drive belt is powered by means of a motor (reference item 22) attached to the aft roller which is also provided with a pully (reference item 21P) and drive belt (reference item 21B) connections to drive the takeup rollers (reference items 17 and 18) for the membrane and paper strip.

It is also taught by Leonard *et al.* that the ammonia is evenly distributed for uniform application across the entire width of the membrane. The ammonia is supplied through a distributor tube (reference item 27) having a uniformly spaced set of holes (reference item 27H) opening toward the membrane. The tube is located adjacent the upstream extremity of the

vacuum slit that divides the test head. The distributor tube 27 is embedded within a foam rubber block 28, the foam being soft enough to accommodate contact without damage to the membrane. The foam block ensures uniform application of the ammonia to the membrane. Another embodiment is taught in that, instead of using diazo paper and ammonia as the mapping media, other combinations can be used which are compatible with the particular membrane being tested. As shown in figure 7, the transport belt has a porous surface impregnated with a detector means, such as phenolphthalene, that contacts the lower surface of the membrane due to the action of the partial vacuum in the lower chamber. If ammonia is applied to the upper chamber it will be drawn through any pinholes in the membrane to produce temporary pink indications on the impregnated belt. The operator can thus locate such holes while the membrane is traveling. It is also taught that other gases or liquids may be distributed to the supply chamber to cooperate with compatible indicators impregnated into the belt.

Leonard *et al.*, however, does not expressly teach the inspection of the moving membrane's surface. However, the inspection of a surface of a moving web would have been well within the scope of one of ordinary skill in the art. See, for example, Wolf, Jr. *et al.* where a method and apparatus for testing a membrane strip for leaks due to pinholes is taught. A detector fluid is applied to one face of the strip while bringing a detection medium into proximity with the other face thereof, and producing a pressure difference between the opposite faces of the strip in a sense to cause flow of the detector fluid through any open pin holes in the strip, and accordingly into contact with the detection medium. In accordance with this invention, a membrane-compatible liquid is applied to the membrane strip prior to testing for pinholes, so that the liquid is retained in the pinholes by capillary attraction. The detector fluid, using

ammonia as an example, is applied to the upper surface of membrane (reference item 10) while a pressure difference is produced in a sense to urge the detector fluid to pass through any pinholes in the membrane. The pressure is adjusted to cause the membrane-compatible liquid to be pushed out of pinholes. When this takes place, the detector fluid passes through membrane to cause an indicating mark to form on indicator strip (reference item 22). The membrane passes across repair station (reference item 32) where the membrane is visually inspected. When using thin, porous polytetrafluoroethylene or polypropylene membranes, these are taught as being sufficiently translucent so that the purple mark produced by paper in the presence of ammonia is visible through the membrane by the operator. Furthermore, Wolf, Jr. *et al.* teaches that it is known to pass the web through an optional drying station (reference item 31) to remove the residual liquid and dry the membrane.

Leonard *et al.* in view of Wolf, Jr. *et al.* does not teach the use of a liquid other than ammonia for the pinhole testing. Carroll *et al.* teaches that it is known to test a barrier laminate for holes using a liquid other than ammonia after the laminate has been removed from a manufacturing machine. The barrier laminate (reference item 10) can be comprised of a liquid impermeable film (reference item 12) with at least one fibrous substrate (reference items 14 and 16) disposed on each surface of the film. Carroll *et al.* further teaches the testing of the film barrier by a liquid moisture seepage test. The liquid moisture seepage test visually demonstrates the substantial liquid impermeability of the laminate. As described in the example below, this test determines whether a solution of food dye, isopropyl alcohol and water passes through a sheet material. The dye in alcohol solution did not pass through the barrier laminate. Seepage is detected using a solution of isopropyl alcohol, water, and red dye food color. According to this

test, a sheet of a white absorbent blotting material is placed on a flat surface and covered with a test sample of the same dimensions with the substrate side of the sample facing up. The solution is poured on top of the test sample and covered with a template. A weight is placed on top of the template for 10 minutes after which the weight, template, and test sample are removed from the white blotting paper. The paper is then inspected for ink spots to determine whether seepage occurred.

It is also noted that the use of the blotting paper is not necessary for all applications. The laminate, being comprised of at least one outer fibrous layer, would inherently show or otherwise exhibit the staining from the dye solution. However detecting the staining by manual means may not be accurate due in part to the coloration of the fibrous layer. Therefore, the blotting paper may be used, but it is not necessary for all applications of the seepage test. See, for example, references to *Ex parte Wu*, 10 USPQ 2031 (Bd. Pat. App. & Inter. 1989)[1]. See also references to *In re Larson*, 340 F.2d 965, 144 USPQ 347 (CCPA 1965)[2] and *In re Kuhle*, 526 F.2d 553, 188 USPQ 7 (CCPA 1975)[3].

Leonard *et al.* in view of Wolf, Jr. *et al.* and Carroll *et al.* does not teach the use of a "vision system" for inspecting a surface of the moving web. Leonard *et al.*, Wolf, Jr. *et al.*, and Carroll *et al.* teach the use of visual inspection by the operators of their respective devices.

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[1] Claims at issue were directed to a method for inhibiting corrosion on metal surfaces using a composition consisting of epoxy resin, petroleum sulfonate, and hydrocarbon diluent. The claims were rejected over a primary reference which disclosed an anticorrosion composition of epoxy resin, hydrocarbon diluent, and poly basic acid salts wherein said salts were taught to be beneficial when employed in a freshwater environment, in view of secondary references which clearly suggested the addition of petroleum sulfonate to corrosion inhibiting compositions. The Board affirmed the rejection, holding that it would have been obvious to omit the polybasic acid salts of the primary reference where the function attributed to such salt is not desired or required, such as in compositions for providing corrosion resistance in environments which do not encounter fresh water.

[2] Omission of additional framework and axle which served to increase the cargo carrying capacity of prior art mobile fluid carrying unit would have been obvious if this feature was not desired.

[3] Deleting a prior art switch member and thereby eliminating its function was an obvious expedient.

However, modifying the teachings of Leonard *et al.* and Wolf, Jr. *et al.* to utilize an automated process of optically inspecting the web is within the scope of one of ordinary skill. See *In re Venner*, 120 USPQ 192 (CCPA 1958)[4]. However, in the event that the applicant does not agree, Hochgraf teaches that it is known to use a "vision system" to inspect a surface of a moving web. In particular, Hochgraf teaches that it is known to inspect webs for the detection and classification of imperfections in the surface of moving webs, such imperfections including stains and absorbing imperfections, abrasions and scattering imperfections, pinch marks, impurities preventing local processing, tears, through-holes, thickness imperfections, and other far side and near side imperfections that may print through to the surface of the webs. Hochgraf teaches a web inspection station comprising a linear light source (reference item 17) for inspecting the surface of a web (reference item 10). The web is shown being moved longitudinally while being wrapped around rollers (reference items 12 and 14). A line of light is emitted from a slit extending lengthwise of linear light source and directed onto the surface of the web in a bright line (reference item 24). The line striking the surface of web is reflected toward a lens (reference item 26) onto a detector face (reference item 28) of a conventional linear CCD array or camera (reference item 30) which produces an electrical output signal as the CCD elements are scanned electronically in a manner known in the art. The output signal is fed by cable (reference item 34) to signal processing circuitry in box (reference item 36) and thereafter to a recording and display system. The use of a "vision system" such as that taught by Hochgraf would have been an obvious modification to the teachings of Leonard *et al.* in view of Wolf *et al.* as the vision system would be more accurate, would detect flaws faster, could detect

[4] It is not invention to broadly provide mechanical or automatic means to replace manual activity which accomplished same result.

substantially more flaws per unit time than a normal person, and could retain the results of the inspection in a computer where it could be analyzed for manufacturing quality control purposes.

In all, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Leonard *et al.* with the teachings of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf to obtain a web inspection apparatus that inspects a surface of a moving web, either manually or with a vision system, in order to determine the presence of pinholes in the moving web where the presence is detected by the presence of a stain from a dye or other colored solution comprising alcohol and/or water.

11. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf as applied to claim 1 above. Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf teaches that it is known that the testing procedure maintains the pressure differential across the membrane *approximately* at the value experienced by the membrane in actual service. See MPEP 2144.04 and *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)[5]. It would have been obvious to one of ordinary skill in the art to modify the teachings of Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf, in particular the teaching of Leonard *et al.* where testing is done at "*approximately* at the value experienced by the membrane in actual service" so that the testing covers all of the expected maximum values and covers any unforeseen operating conditions that the membrane might be exposed to so as to avoid having to retest the membrane in order to properly certify its use in the new, unforeseen environment.

[5] Claimed process which was performed at a temperature between 40°C and 80°C and an acid concentration between 25% and 70% was held to be prima facie obvious over a reference process which differed from the claims only in that the reference process was performed at a temperature of 100°C and an acid concentration of 10%.

12. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf as applied to claim 1 above. Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf teaches that it is known to inspect webs for pinholes. Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf teaches, implicitly, that their respective webs, laminates, or films are all manufactured at some point in time prior to the inspection. Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf does not expressly or implicitly teach that the machine used to inspect the webs, laminates, or films is the same machine used in the manufacturing of the same webs, laminates, or films. It is well known to combine the functions or to broadly make separate parts integral. See MPEP 2144.04 and *In re Larson*, 340 F.2d 965, 968, 144 USPQ 347, 349 (CCPA 1965)[6]. Combining the two functions of manufacturing and inspecting, in broad manner, would have been obvious to one of ordinary skill in the art in order to save the expense of having to buy, operate, and maintain two separate machines.

13. Claims 19 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf as applied to claim 1 above, and further in view of United States Patent Application Publication 2002/0109112 to Guha *et al.* Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf teaches that it is known to inspect webs for pinholes. Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf does not teach a method wherein an alarm is generated when a defect is detected. Guha *et al.* teaches a web inspection system that detects flaws along the machine direction and cross

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[6] A claim to a fluid transporting vehicle was rejected as obvious over a prior art reference which differed from the prior art in claiming a brake drum integral with a clamping means, whereas the brake disc and clamp of the prior art comprise several parts rigidly secured together as a single unit. The court affirmed the rejection holding, among other reasons, "that the use of a one piece construction instead of the structure disclosed in [the prior art] would be merely a matter of obvious engineering choice.

direction of a web. The web inspection system utilizes a multiple of smart cameras connected to a host computer via an ethernet hub. The inspection system (reference item 800) comprises smart cameras (reference item 804) that monitors a section (reference item 806) of the web (reference item 814). Any number of smart cameras may be connected and synchronized via a control signal (reference item 808) from an encoder (reference item 816) monitoring the speed of the web. The control signal from the encoder is utilized by the smart camera to determine the position of a detected flaw or defect on the portion of the web that is monitored by the smart camera. Each smart camera is connected via standard ethernet cabling reference item 810) to an ethernet hub (reference item 802). One of the nodes (reference item 812) on the ethernet hub is a personal computer (reference item 818) having an operator interface that provides a control and monitoring means for the web inspection system. Devices such as alarms (reference item 820) may be connected to a control line (reference item 811) to provide automatic means for notifying the operator of flaws or defects that exceed a predetermined threshold. The use of an alarm would have been an obvious modification to the teachings of Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf as the alarm would allow the user to be notified when a predetermined quantity of holes or a predetermined size of holes is detect that might be an indicator of a manufacturing defect.

Furthermore, Guha *et al.* also teaches that, in the prior art it is known to use an optical inspection system for webs were the processed image from the vision processor is sent to a host computer for display. Also connected to the host computer is a defect marker and an encoder. The encoder sends information to the host computer including the speed of the web. The web typically moves over a rotary device driven by a shaft and roller that produce pulses per unit

distance. The host computer 14 utilizes this information to determine the size and position of a defect. The host computer 14 may also include a database input/output board to control the defect marking system and other peripheral device connections. The use of a marking system would have been an obvious modification over the teachings of Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf as marking the web would allow a more permanent record of the locations of the defects, and would also allow the user to scrap only those sections of the web that are defect and use those sections of the web that do not have defects.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf with the teachings of Guha *et al.* in order to provide a method for inspecting webs in which an alarm is generated when defects are detected, and to provide a defect marking that marks the locations of the defects on the web.

14. Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf as applied to claims 1 and 23 above, and further in view of United States Patent 5,196,799 to Beard *et al.* Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf teaches that it is known to inspect webs for pinholes using a liquid. Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf does not teach a method wherein the liquid comprises a surfactant. Beard *et al.* teaches that it is known to test a protective barrier for pinholes using a liquid. Beard *et al.* teaches a protective barrier material (reference item 28) having a hole or pore is placed into the bath solution (reference item 30), a portion of the electrically conducting solution passes through the hole and wets the mandrel (reference item 10'). As a result, there is an increase in surface area on the mandrel at the pore-

mandrel interface, thereby decreasing the polarization impedance. Accordingly, a wetting agent is preferably used to decrease the quality factor for small holes, thereby increasing the measurement sensitivity. Beard *et al.* teaches that the suitable wetting agent to be used in the bath solution comprises a surfactant and/or an alcohol. Surfactant are beneficial as they are substances capable of reducing the surface tension of a liquid in which it is dissolved, thereby allowing the liquid to pass through the pores of the protective membrane in an easier manner. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf with the teachings of Beard *et al.* to utilize a liquid comprising a surfactant in order to detect pinholes in a protective membrane or film.

15. Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf as applied to claim 1 above, and further in view of United States Patent 3,254,526 to Yarbrough. Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf teaches that it is known to inspect webs for pinholes using a liquid. Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf does not teach a method wherein the liquid comprises a hydrocarbon. Yarbrough teaches a method and apparatus for testing impermeable membranes. The film/membrane passes through a bath (reference item 14) containing a liquid. Simultaneously, a drum roller rotates and pulls a vacuum in order to draw the liquid through any pinholes in the membrane. The liquid in Yarbrough is taught as comprising water, hydrocarbons, alcohols, esters, ketones, or a liquid with a dissolved dye. The use of a hydrocarbon in the teachings of Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf would have been an obvious modification in that it is known that hydrocarbons

evaporate quickly and would not require a separate drying station for the web. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf with the teachings of Yarbrough in order to obtain a method to detect pinholes in a membrane using a liquid comprising a hydrocarbon.

16. Claim 46 is rejected under 35 U.S.C. 103(a) as being unpatentable over Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf as applied to claim 45 above, and further in view of Yarbrough. Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf teaches that it is known to inspect membranes for pinholes using a liquid and a vacuum source. Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf does not teach that it is known to use a rotary vacuum source to produce the vacuum on the membrane. Yarbrough teaches a method and apparatus for testing impermeable membranes. The film/membrane passes through a bath (reference item 14) containing a liquid. Simultaneously, a drum roller rotates and pulls a vacuum in order to draw the liquid through any pinholes in the membrane. The use of a rotary vacuum source, such as that disclosed by Yarbrough, would have been preferred as the rotary vacuum's angular speed is equal to that of the traveling speed of the membrane and would, therefore, cause less abrasion/rubbing damage to the membrane as it travels. Furthermore, the rotary vacuum has the added benefit of being in better contact with the membrane and would, therefore produce a better seal with the membrane. Leonard *et al.* recognizes that their system may not, in all cases, produce a desired seal with the membrane so that a means to create holes (reference item 12P) may be required. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Leonard

et al. in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf with the teachings of Yarbrough in order to obtain an apparatus for testing membranes for pinholes where the vacuum is generated by a rotary vacuum source.

17. Claim 47 is rejected under 35 U.S.C. 103(a) as being unpatentable over Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf as applied to claim 45 above, and further in view of United States Patent 5,672,407 to Beckett. Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf teaches that it is known to utilize an apparatus for testing for pinholes in membranes or films. Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf does not teach the use of a scrapper to remove the liquid. Beckett teaches an apparatus where a web (reference item 14) enters a bath (reference item 36) for processing. As the web leaves the bath at the downstream end of the tank (reference item 28) but before the web leaves the tank, the web engages a first doctor blade (reference item 50) and then a second doctor blade (reference item 52) to wipe off the liquid from the surfaces of the web, and retain such liquid in the tank. The web then passes to a washing and drying station (reference item 56). The web has wash water sprayed on by first wash water sprayers (reference item 58) followed by wiping of the washed surface by a first wiper blade (reference item 60), and then has wash water sprayed on again by second wash water sprayers (reference item 62) followed by wiping of the washed surface by a second wiper blade (reference item 64). Therefore, the use of scrappers/blades is well known in the art of web processing to remove moisture from the surface of the webs. The use of scrapers/blades in the teachings of Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf would have been preferred as the pressure of the blades easily contact the entire surface of the web to remove the liquid thereby removing any need for additional drying means

such as sponges or heaters. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf with the teachings of Beckett in order to obtain an apparatus for testing membranes, webs, laminates, or films where the membrane is cleaned of a liquid by means of a scraper/blade.

18. Claims 29 and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf as applied to claims 11 and 45 above, and further in view of United States Patent 6,345,453 to Ilomaki *et al.* Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf teaches that it is known to inspect membranes for pinholes using a liquid. Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf does not teach a method to spray a surface of the membrane with a liquid in order to clean the membrane. Ilomaki *et al.* teaches that it is known to clean a moving web by spraying a liquid on the surface using a cleaning apparatus (reference item 11). The apparatus of Ilomaki *et al.* comprises a forming wire (reference item 3) that travels across several rollers. In the cleaning apparatus a spraying apparatus (reference item 12) sprays water on the wire. It would be inherent that any stains on the wire would be reduced by the spraying feature. Similarly, modifying the teachings of Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf to utilize a spraying device such as that taught by Ilomaki *et al.* would have been obvious in order to clean the web so that the stains from the penetrant liquid are reduce so as to allow the membrane to be used in a manufacturing process, i.e. manufacturing materials whose requirement to be free from pinholes is not needed. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Leonard *et al.* in

view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf with the teachings of Ilomaki *et al.* in order to obtain a method of cleaning a membrane using a spraying means.

19. Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf as applied to claims 1 above, and further in view of United States Patent 6,183,599 to Oriaran *et al.* Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf teaches that it is known to inspect membranes for pinholes using a liquid. Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf does not teach a method to store and reuse a liquid drawn through the web. Oriaran *et al.* teaches a processing apparatus for forming webs. Oriaran *et al.* teaches, in particular, that a forming fabric (reference item 12) is supported on rolls (reference items 18 and 19) which are positioned relative to a breast roll (reference item 15) for pressing the press wire to converge on the foraminous support member (reference item 11) at the cylindrical breast roll. The foraminous support member and the wire move in the same direction and at the same speed which is the same direction of rotation of the breast roll. The pressing wire and the foraminous support member converge at an upper surface of the forming roll to form a wedge-shaped space or nip into which two jets of water or foamed-liquid fiber dispersion is pressed between the pressing wire and the foraminous support member to force fluid through the wire into a saveall (reference item 22) where it is collected for reuse in the process. It would have been beneficial and desired to modify the teachings of Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf with the ability to collect the sprayed liquid, as taught by Oriaran *et al.* as this would allow the device to operate in a less expensive manner, or it may be preferred if the sprayed liquid is potentially hazardous to the environment. It would have been obvious to one of ordinary skill in the art at the time of the

invention to modify the teachings of Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf with the teachings of Oriaran *et al.* in order to obtain a method to test membranes for pinholes with a liquid and to collect the liquid for resuse.

20. Claims 37-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, Hochgraf, and Ilomaki *et al.* as applied to claims 1, 11, and 29 above, and further in view of Oriaran *et al.* Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, Hochgraf, and Ilomaki *et al.* teaches that it is known to test membranes for pinholes and to spray a membrane with a liquid in order to reduce the staining that results from the test. Furthermore, Carroll *et al.* teaches that it is know to use an alcohol and water solution in the pinhole testing. Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, Hochgraf, and Ilomaki *et al.* does not teach a method to test membranes where the rinse liquid is stored for reuse. Oriaran *et al.* teaches, in particular, that a forming fabric (reference item 12) is supported on rolls (reference items 18 and 19) which are positioned relative to a breast roll (reference item 15) for pressing the press wire to converge on the foraminous support member (reference item 11) at the cylindrical breast roll. The foraminous support member and the wire move in the same direction and at the same speed which is the same direction of rotation of the breast roll. The pressing wire and the foraminous support member converge at an upper surface of the forming roll to form a wedge-shaped space or nip into which two jets of water or foamed-liquid fiber dispersion is pressed between the pressing wire and the foraminous support member to force fluid through the wire into a saveall (reference item 22) where it is collected for reuse in the process. Modifying the teachings of Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, Hochgraf, and Ilomaki *et al.* with the teachings of Oriaran *et al.* to further include a rinsing liquid

comprising alcohol and/or water would have been obvious as alcohol/water solutions are already used in the pinhole detection, as is taught by Carroll *et al.*, and would have allowed the user to maintain a single solution source for both pinhole testing and rinsing rather than have two dissimilar solutions, and, as is well known, alcohols are quick to evaporate and would allow the membrane to dry faster. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, Hochgraf, and Ilomaki *et al.* with the teachings of Oriaran *et al.* in order to obtain a method of rinsing a membrane using a spray of alcohol and/or water, and to save the spray for reuse.

21. Claim 54 is rejected under 35 U.S.C. 103(a) as being unpatentable over Leonard *et al.* in view of Wolf, Jr. *et al.*, and Hochgraf. Leonard *et al.* teaches that it is known to use a liquid and a vacuum to detect pinholes in moving webs. In particular, Leonard *et al.* teaches methods and devices testing membranes for pin hole leaks are provided wherein the membrane (reference item M) is supplied from a storage roll (reference item 11) to pass in unison with a detector or indicator means (reference item D) through a combined detector fluid applicator and draw-off station, where the detector fluid passes through any holes in the membrane and changes the state of or exposes the detector means. The test station employs a compartmented distributor head having a vacuum slit through which the membrane and the detector means travel. The presence of the membrane and detector means in the slit divides the head into a detector fluid supply chamber that is bounded by the membrane and a vacuum chamber that is bounded by the detector means. The testing maintains the pressure differential across the membrane approximately at the value experienced by the membrane in actual service. A membrane testing arrangement is shown in figure 1 wherein the membrane (reference item M) to be tested is

provided in strip form and is supported on a supply roll (reference item 11). A detection means is shown in the form of an indicator medium such as diazo paper (reference item D) for recording or mapping defects in the membrane. The diazo paper is stored on a supply roll (reference item 12) beneath the membrane roll. The membrane and the indicator paper are shown passing in unison along a test path that leads through a chambered test station (reference item 13) where a detector fluid, such as ammonia, is applied directly to the membrane while a vacuum is maintained beneath the indicator paper. The vacuum acts through perforations in the indicator paper provided by the perforator wheel (reference item 12P) to cause the ammonia to be drawn through any pinholes in the membrane for producing indications on the paper at locations corresponding to the locations of such pinholes. As the membrane and paper move in unison, any pinholes in the membrane remain in register with the indications appearing on the paper to allow immediate repair. The ammonia is applied to the upper chamber it will be drawn through any pinholes in the membrane to produce temporary pink indications on the impregnated belt. The operator can thus locate such holes while the membrane is traveling. It is also taught that other gases or liquids may be distributed to the supply chamber to cooperate with compatible indicators impregnated into the belt.

Leonard *et al.*, however, does not expressly teach the inspection of the moving membrane's surface. However, the inspection of a surface of a moving web would have been well within the scope of one of ordinary skill in the art. See, for example, Wolf, Jr. *et al.* where a method and apparatus for testing a membrane for leaks due to pinholes is taught. A detector fluid is applied to one face of the membrane while bringing a detection medium into proximity with the other face thereof, and producing a pressure difference between the opposite faces of the

strip in a sense to cause flow of the detector fluid through any open pin holes in the strip, and accordingly into contact with the detection medium. In accordance with this invention, a membrane-compatible liquid is applied to the membrane prior to testing for pinholes, so that the liquid is retained in the pinholes by capillary attraction. The detector fluid, using ammonia as an example, is applied to the upper surface of membrane (reference item 10) while a pressure difference is produced in a sense to urge the detector fluid to pass through any pinholes in the membrane. The pressure is adjusted to cause the membrane-compatible liquid to be pushed out of pinholes. When this takes place, the detector fluid passes through membrane to cause an indicating mark to form on indicator strip (reference item 22). The membrane passes across repair station (reference item 32) where the membrane is visually inspected. When using thin, porous polytetrafluoroethylene or polypropylene membranes, these are taught as being sufficiently translucent so that the purple mark produced by paper in the presence of ammonia is visible through the membrane by the operator.

In the event that the applicant is not convinced that it is within the scope of one of ordinary skill to inspect the web in view of the teachings of Leonard *et al.* in view of Wolf, Jr. *et al.*, Hochgraf teaches that it is known to use a "vision system" to inspect a surface of a moving web. In particular, Hochgraf teaches that it is known to inspect webs for the detection and classification of imperfections in the surface of moving webs, such imperfections including stains and absorbing imperfections, abrasions and scattering imperfections, pinch marks, impurities preventing local processing, tears, through-holes, thickness imperfections, and other far side and near side imperfections that may print through to the surface of the webs. Hochgraf teaches a web inspection station comprising a linear light source (reference item 17) for

inspecting the surface of a web (reference item 10). The web is shown being moved longitudinally while being wrapped around rollers (reference items 12 and 14). A line of light is emitted from a slit extending lengthwise of linear light source and directed onto the surface of the web in a bright line (reference item 24). The line striking the surface of web is reflected toward a lens (reference item 26) onto a detector face (reference item 28) of a conventional linear CCD array or camera (reference item 30) which produces an electrical output signal as the CCD elements are scanned electronically in a manner known in the art. The output signal is fed by cable (reference item 34) to signal processing circuitry in box (reference item 36) and thereafter to a recording and display system. It would be preferred to modify the teachings of Leonard *et al.* in view of Wolf, Jr. *et al.* with the teachings of Hochgraf so that the costs associated with building and maintaining an apparatus to utilize the marking paper, i.e. the diazo paper, can be avoided, as will the costs of not having to buy the marking paper, and the vision system would be more accurate, would detect flaws faster, could detect substantially more flaws per unit time than a normal person, and could retain the results of the inspection in a computer where it could be analyzed for manufacturing quality control purposes.

22. Leonard *et al.* in view of Wolf *et al.* and Hochgraf does not teach a method where the pressure tested is 15% higher than the expected maximum pressure. Leonard *et al.* in view of Wolf, Jr. *et al.*, Carroll *et al.*, and Hochgraf teaches that it is known that the testing procedure maintains the pressure differential across the membrane *approximately* at the value experienced by the membrane in actual service. See again MPEP 2144.04 and *In re Aller*. It would have been obvious to one of ordinary skill in the art to modify the teachings of Leonard *et al.* in view of Wolf, Jr. *et al.*, and Hochgraf, in particular the teaching of Leonard *et al.* where testing is done

at "*approximately* at the value experienced by the membrane in actual service" so that the testing covers all of the expected maximum values and covers any unforeseen operating conditions that the membrane might be exposed to so as to avoid having to retest the membrane in order to properly certify its use in the new, unforeseen environment.

23. Claim 60 is rejected under 35 U.S.C. 103(a) as being unpatentable over Leonard *et al.* in view of Wolf, Jr. *et al.*, Hochgraf, and Ilomaki *et al.* Leonard *et al.* teaches that it is known to use a liquid and a vacuum to detect pinholes in moving webs. In particular, Leonard *et al.* teaches methods and devices testing membranes for pin hole leaks are provided wherein the membrane (reference item M) is supplied from a storage roll (reference item 11) to pass in unison with a detector or indicator means (reference item D) through a combined detector fluid applicator and draw-off station, where the detector fluid passes through any holes in the membrane and changes the state of or exposes the detector means. The test station employs a compartmented distributor head having a vacuum slit through which the membrane and the detector means travel. The presence of the membrane and detector means in the slit divides the head into a detector fluid supply chamber that is bounded by the membrane and a vacuum chamber that is bounded by the detector means. The testing maintains the pressure differential across the membrane approximately at the value experienced by the membrane in actual service. A membrane testing arrangement is shown in figure 1 wherein the membrane (reference item M) to be tested is provided in strip form and is supported on a supply roll (reference item 11). A detection means is shown in the form of an indicator medium such as diazo paper (reference item D) for recording or mapping defects in the membrane. The diazo paper is stored on a supply roll (reference item 12) beneath the membrane roll. The membrane and the indicator paper are

shown passing in unison along a test path that leads through a chambered test station (reference item 13) where a detector fluid, such as ammonia, is applied directly to the membrane while a vacuum is maintained beneath the indicator paper. The vacuum acts through perforations in the indicator paper provided by the perforator wheel (reference item 12P) to cause the ammonia to be drawn through any pinholes in the membrane for producing indications on the paper at locations corresponding to the locations of such pinholes. As the membrane and paper move in unison, any pinholes in the membrane remain in register with the indications appearing on the paper to allow immediate repair. The ammonia is applied to the upper chamber it will be drawn through any pinholes in the membrane to produce temporary pink indications on the impregnated belt. The operator can thus locate such holes while the membrane is traveling. It is also taught that other gases or liquids may be distributed to the supply chamber to cooperate with compatible indicators impregnated into the belt.

Leonard *et al.*, however, does not expressly teach the inspection of the moving membrane's surface. However, the inspection of a surface of a moving web would have been well within the scope of one of ordinary skill in the art. See, for example, Wolf, Jr. *et al.* where a method and apparatus for testing a membrane for leaks due to pinholes is taught. A detector fluid is applied to one face of the membrane while bringing a detection medium into proximity with the other face thereof, and producing a pressure difference between the opposite faces of the strip in a sense to cause flow of the detector fluid through any open pin holes in the strip, and accordingly into contact with the detection medium. In accordance with this invention, a membrane-compatible liquid is applied to the membrane prior to testing for pinholes, so that the liquid is retained in the pinholes by capillary attraction. The detector fluid, using ammonia as an

example, is applied to the upper surface of membrane (reference item 10) while a pressure difference is produced in a sense to urge the detector fluid to pass through any pinholes in the membrane. The pressure is adjusted to cause the membrane-compatible liquid to be pushed out of pinholes. When this takes place, the detector fluid passes through membrane to cause an indicating mark to form on indicator strip (reference item 22). The membrane passes across repair station (reference item 32) where the membrane is visually inspected. When using thin, porous polytetrafluoroethylene or polypropylene membranes, these are taught as being sufficiently translucent so that the purple mark produced by paper in the presence of ammonia is visible through the membrane by the operator.

In the event that the applicant is not convinced that it is within the scope of one of ordinary skill to inspect the web in view of the teachings of Leonard *et al.* in view of Wolf, Jr. *et al.*, Hochgraf teaches that it is known to use a "vision system" to inspect a surface of a moving web. In particular, Hochgraf teaches that it is known to inspect webs for the detection and classification of imperfections in the surface of moving webs, such imperfections including stains and absorbing imperfections, abrasions and scattering imperfections, pinch marks, impurities preventing local processing, tears, through-holes, thickness imperfections, and other far side and near side imperfections that may print through to the surface of the webs. Hochgraf teaches a web inspection station comprising a linear light source (reference item 17) for inspecting the surface of a web (reference item 10). The web is shown being moved longitudinally while being wrapped around rollers (reference items 12 and 14). A line of light is emitted from a slit extending lengthwise of linear light source and directed onto the surface of the web in a bright line (reference item 24). The line striking the surface of web is reflected

toward a lens (reference item 26) onto a detector face (reference item 28) of a conventional linear CCD array or camera (reference item 30) which produces an electrical output signal as the CCD elements are scanned electronically in a manner known in the art. The output signal is fed by cable (reference item 34) to signal processing circuitry in box (reference item 36) and thereafter to a recording and display system. It would be preferred to modify the teachings of Leonard *et al.* in view of Wolf, Jr. *et al.* with the teachings of Hochgraf so that the costs associated with building and maintaining an apparatus to utilize the marking paper, i.e. the diazo paper, can be avoided, as will the costs of not having to buy the marking paper, and the vision system would be more accurate, would detect flaws faster, could detect substantially more flaws per unit time than a normal person, and could retain the results of the inspection in a computer where it could be analyzed for manufacturing quality control purposes.

Leonard *et al.* in view of Wolf, Jr. *et al.* and Hochgraf does not teach a method to rinse the web in order to clean the web. Ilomaki *et al.* teaches that it is known to clean a moving web by spraying a liquid on the surface using a cleaning apparatus (reference item 11). The apparatus of Ilomaki *et al.* comprises a forming wire (reference item 3) that travels across several rollers. In the cleaning apparatus a spraying apparatus (reference item 12) sprays water on the wire. It would be inherent that any stains on the wire would be reduced by the spraying feature. Similarly, modifying the teachings of Leonard *et al.* in view of Wolf, Jr. *et al.*, and Hochgraf to utilize a spraying device such as that taught by Ilomaki *et al.* would have been obvious in order to clean the web so that the stains from the penetrant liquid are reduce so as to allow the membrane to be used in a manufacturing process, i.e. manufacturing materials whose requirement to be free from pinholes is not mandatory.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Leonard *et al.* with the teachings of Wolf, Jr. *et al.*, Hochgraf, and Ilomaki *et al.* in order to obtain a method of to inspect a moving web for the presence of pinholes web and to use a cleaning spray to clean the web after the inspection.

24. Claim 61 is rejected under 35 U.S.C. 103(a) as being unpatentable over of Leonard *et al.* in view of Wolf, Jr. *et al.*, Hochgraf, and Beard *et al.* Leonard *et al.* teaches that it is known to use a liquid and a vacuum to detect pinholes in moving webs. In particular, Leonard *et al.* teaches methods and devices testing membranes for pin hole leaks are provided wherein the membrane (reference item M) is supplied from a storage roll (reference item 11) to pass in unison with a detector or indicator means (reference item D) through a combined detector fluid applicator and draw-off station, where the detector fluid passes through any holes in the membrane and changes the state of or exposes the detector means. The test station employs a compartmented distributor head having a vacuum slit through which the membrane and the detector means travel. The presence of the membrane and detector means in the slit divides the head into a detector fluid supply chamber that is bounded by the membrane and a vacuum chamber that is bounded by the detector means. The testing maintains the pressure differential across the membrane approximately at the value experienced by the membrane in actual service. A membrane testing arrangement is shown in figure 1 wherein the membrane (reference item M) to be tested is provided in strip form and is supported on a supply roll (reference item 11). A detection means is shown in the form of an indicator medium such as diazo paper (reference item D) for recording or mapping defects in the membrane. The diazo paper is stored on a supply roll (reference item 12) beneath the membrane roll. The membrane and the indicator paper are

shown passing in unison along a test path that leads through a chambered test station (reference item 13) where a detector fluid, such as ammonia, is applied directly to the membrane while a vacuum is maintained beneath the indicator paper. The vacuum acts through perforations in the indicator paper provided by the perforator wheel (reference item 12P) to cause the ammonia to be drawn through any pinholes in the membrane for producing indications on the paper at locations corresponding to the locations of such pinholes. As the membrane and paper move in unison, any pinholes in the membrane remain in register with the indications appearing on the paper to allow immediate repair. The ammonia is applied to the upper chamber it will be drawn through any pinholes in the membrane to produce temporary pink indications on the impregnated belt. The operator can thus locate such holes while the membrane is traveling. It is also taught that other gases or liquids may be distributed to the supply chamber to cooperate with compatible indicators impregnated into the belt.

Leonard *et al.*, however, does not expressly teach the inspection of the moving membrane's surface. However, the inspection of a surface of a moving web would have been well within the scope of one of ordinary skill in the art. See, for example, Wolf, Jr. *et al.* where a method and apparatus for testing a membrane for leaks due to pinholes is taught. A detector fluid is applied to one face of the membrane while bringing a detection medium into proximity with the other face thereof, and producing a pressure difference between the opposite faces of the strip in a sense to cause flow of the detector fluid through any open pin holes in the strip, and accordingly into contact with the detection medium. In accordance with this invention, a membrane-compatible liquid is applied to the membrane prior to testing for pinholes, so that the liquid is retained in the pinholes by capillary attraction. The detector fluid, using ammonia as an

example, is applied to the upper surface of membrane (reference item 10) while a pressure difference is produced in a sense to urge the detector fluid to pass through any pinholes in the membrane. The pressure is adjusted to cause the membrane-compatible liquid to be pushed out of pinholes. When this takes place, the detector fluid passes through membrane to cause an indicating mark to form on indicator strip (reference item 22). The membrane passes across repair station (reference item 32) where the membrane is visually inspected. When using thin, porous polytetrafluoroethylene or polypropylene membranes, these are taught as being sufficiently translucent so that the purple mark produced by paper in the presence of ammonia is visible through the membrane by the operator.

In the event that the applicant is not convinced that it is within the scope of one of ordinary skill to inspect the web in view of the teachings of Leonard *et al.* in view of Wolf, Jr. *et al.*, Hochgraf teaches that it is known to use a "vision system" to inspect a surface of a moving web. In particular, Hochgraf teaches that it is known to inspect webs for the detection and classification of imperfections in the surface of moving webs, such imperfections including stains and absorbing imperfections, abrasions and scattering imperfections, pinch marks, impurities preventing local processing, tears, through-holes, thickness imperfections, and other far side and near side imperfections that may print through to the surface of the webs. Hochgraf teaches a web inspection station comprising a linear light source (reference item 17) for inspecting the surface of a web (reference item 10). The web is shown being moved longitudinally while being wrapped around rollers (reference items 12 and 14). A line of light is emitted from a slit extending lengthwise of linear light source and directed onto the surface of the web in a bright line (reference item 24). The line striking the surface of web is reflected

toward a lens (reference item 26) onto a detector face (reference item 28) of a conventional linear CCD array or camera (reference item 30) which produces an electrical output signal as the CCD elements are scanned electronically in a manner known in the art. The output signal is fed by cable (reference item 34) to signal processing circuitry in box (reference item 36) and thereafter to a recording and display system. It would be preferred to modify the teachings of Leonard *et al.* in view of Wolf, Jr. *et al.* with the teachings of Hochgraf so that the costs associated with building and maintaining an apparatus to utilize the marking paper, i.e. the diazo paper, can be avoided, as will the costs of not having to buy the marking paper, and the vision system would be more accurate, would detect flaws faster, could detect substantially more flaws per unit time than a normal person, and could retain the results of the inspection in a computer where it could be analyzed for manufacturing quality control purposes.

Leonard *et al.* in view of Wolf *et al.* and Hochgraf does not teach a method where the testing liquid is water and a surfactant. Beard *et al.* teaches that it is known to test a protective barrier for pinholes using a liquid. Beard *et al.* teaches a protective barrier material (reference item 28) having a hole or pore is placed into the bath solution (reference item 30), a portion of the electrically conducting solution passes through the hole and wets the mandrel (reference item 10'). As a result, there is an increase in surface area on the mandrel at the pore-mandrel interface, thereby decreasing the polarization impedance. Accordingly, a wetting agent is preferably used to decrease the quality factor for small holes, thereby increasing the measurement sensitivity. Beard *et al.* teaches that the suitable wetting agent to be used in the bath solution comprises a surfactant and/or an alcohol. Surfactant are beneficial as they are substances capable of reducing the surface tension of a liquid in which it is dissolved, thereby

allowing the liquid to pass through the pores of the protective membrane in an easier manner. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Leonard *et al.* in view of Wolf, Jr. *et al.*, Hochgraf, and Beard *et al.* in order to obtain a method of to inspect a moving web for the presence of pinholes web and to use a utilize a liquid comprising a surfactant in order to detect pinholes in a protective membrane or film.

25. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David A. Rogers whose telephone number is (703) 305-4451. The examiner can normally be reached on Monday - Friday (0730 - 1600).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron E. Williams can be reached on (703) 305-4705. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

dar
December 11, 2003

HEZRON WILLIAMS
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